

lum and shoulder a small granuliform crest; body beneath covered with a long brownish-fulvous pubescence, but whitish on the metasternum; femora darkish but fading to a pale colour on the tibiæ and tarsi; antennæ fulvous brown, base of all the joints, from the third inclusive, paler. Length 14 lines.

In the same Proceedings, *l. c.*, I proposed *Opepharus* as a generic name for *Monochamus tridentatus*, Chev.* (*signator*, Pasc.), differing from *Anthores* in its longer antennæ in the male (twice as long as the body), with the last joint subulate, the elytra strongly crested at the base, the fore legs of the male longer and more robust than the others, and the metasternum not elongate. *M. asperulus*, White†, should be referred to the same genus.

MISCELLANEOUS.

On the Marine Forms of Crustacea which inhabit the Fresh Waters of Southern Europe. By Prof. HELLER.

EVERY ONE knows the curious discoveries made by Prof. Lovén upon the presence in the Wenern and Wetter lakes of animals identical with species belonging to the Frozen Ocean. The Swedish naturalist has adduced this identity as evidence in favour of the union of these lakes with the sea at a period anterior to history. These discoveries directed attention to the fauna of the lakes situated south of the Alps. As early as 1857, E. von Martens described a series of fishes and Crustacea which, although living in various Italian lakes, present the characters of Mediterranean species‡. Such are, amongst fishes, *Blennius vulgaris*, Pall., from the lakes of Garda and Albano, *Atherina lacustris*, Bon., from the lakes of Albano and Nemi, and, lastly, *Gobius fluviatilis*, Bon., from the lake of Garda and the neighbourhood of Padua,—and amongst the Crustacea, *Palæmon lacustris*, Mart., from the lake of Albano, *Thelphusa fluviatilis*, Latr., from the lakes of Albano and Nemi, and, lastly, *Sphæroma fossarum*, Mart., from the Pontine Marshes. These facts have already been employed by M. Sartorius von Waltershausen in his investigation of the climates of the present and of former periods. This *savant* endeavours to establish that the lakes situated south of the Alps were formerly in communication with the sea, and are only the remains of ancient fiords. Geological changes, by separating them from the sea, converted them into basins of brackish water, which were gradually deprived of their salt, with a rapidity differing according to the abundance of river-water flowing into them. These lacustrine

* Silbermann's Rev. i. No. 9, pl. 7.

† Proc. Zool. Soc. 1858, p. 411.

‡ See 'Annals,' ser. 3. vol. i. p. 50.

reservoirs were carried to a certain height by upheavals, which lowered the temperature of their surface. In the course of these events the marine fauna disappeared, with the exception of a few fishes and Crustacea less sensitive than their fellows to the action of fresh water.

Prof. Heller has carefully investigated the marine forms inhabiting the Italian lakes. He confirms and extends most of the discoveries of M. von Martens, at the same time rectifying some of them. He shows that *Palæmon lacustris* is a species very widely diffused in the fresh waters of the Mediterranean basin. He cites it in the lake of Albano, in the ditches of the *terra firma* in the neighbourhood of Venice, in the marshes round Pavia, in the lake Trasimene, in that of Garda, in the brooks of Dalmatia, in Corfu, in the lake of Albufera in Spain, and, finally, in Egypt. But this species is not peculiar to the fresh waters; it still exists in the North Sea and the Baltic. M. Heller, in fact, recognizes in it the species introduced into science under the names of *P. varians* and *P. antemariæ*. It appears, however, to be wanting in the Mediterranean. M. Milne-Edwards certainly mentions it, in his 'Histoire Naturelle des Crustacés,' as occurring in the Adriatic; but the author himself has found this statement to be erroneous, the specimen in the Paris Museum having really been derived from Lake Trasimene. The crustacean in question is distinguished from all the *Palæmons* by the want of a palpus on the mandibles, by which it approaches the genus *Anchistia*. But as other characters distinguish it from that genus, M. Heller proposes for it the new generic name of *Palæmonetes* (*P. varians*). It is probable that this *Palæmonetes* existed at a prehistoric period in the Adriatic and Mediterranean, as at present in the bays of the North Sea, in places where the water was comparatively not very salt. Subsequently, after the transformation of the bays into lakes, the species gradually accommodated itself to the fresh water, although without attaining its original size. In fact the freshwater individuals are always smaller than the marine.

A similar lot may be reserved in the future for another crustacean of the Adriatic. *Nephrops norvegicus*, which is so common in the northern seas, occurs here and there in the Mediterranean and the Adriatic. In the Gulf of Quarnero, however, it exists in considerable quantity. If this gulf should one day be converted into a lake by an upheaval, this animal would, no doubt, in time become a true freshwater crustacean, whilst its congeners would still live in the northern seas.

Thelphusa fluviatilis is not entirely confined to the lakes of Albano and Nemi; it occurs also in the south of Italy, in Greece, in Cyprus, in the Crimea, in Syria, and in Egypt. As regards the *Spheroma* of the Pontine Marshes, it presents the greatest resemblance to a species (*S. granulatum*) inhabiting the Adriatic and Mediterranean, although they cannot be completely identified.

Lastly, M. Heller describes two new freshwater Crustacea of marine forms. The first is an Amphipod (*Gammarus Veneris*) found by M. Kotschy in the Well of Venus, near Hierokipos, in Cyprus, at

an elevation of 50 feet. This species is almost identical with *Gammarrus marinus*, from which it differs only in a clothing of hairs like that of other lacustrine species.

The second species belongs to the genus *Orchestia* (*O. cavimana*). It was found in great abundance by M. Kotschy in Cyprus, upon Mount Olympus, at an altitude of 4000 feet. It lives in moist places, in the vicinity of a spring. This species appears to differ from *O. Montagui* only by insignificant characters, such as a somewhat smaller size and a darker colour.—*Siebold & Kolliker's Zeitschrift*, xix. p. 156; *Bibl. Univ.* xxxv. June 15, 1869, *Bull. Sci.* pp. 158–160.

On the Leaves of Coniferæ.

By THOMAS MEEHAN, of Germantown, Pennsylvania.

Botanists can scarcely have overlooked the fact that the true leaves of *Pinus* consist of bud-scales, and that what are known as leaves, and what Dr. Engelmann (Gray's Manual, 5th edition, p. 469) calls "secondary leaves" are but phylloid shoots; but I have failed to find any specific reference to the fact in botanical works. Dr. Dickson, however, in a paper "On the Phylloid Shoots of *Sciadopitys verticillata*" (Proceedings of Botanical Congress, 1866, p. 124), remarks, "In *Sciadopitys* I have to call attention to the fact that the leaves of the growing shoots consist, as in *Pinus*, entirely of bud-scales." One would suppose, from this incidental reference to *Pinus*, that he was acquainted with the fact that the so-called leaves of *Pinus* were phylloid shoots; but as the object of the paper is to show that the so-called leaves of *Sciadopitys* are not true leaves, and as any one must know that they are not if already cognizant of the fact in *Pinus*, we may take it for granted that at any rate, if not entirely overlooked, little thought has been given it. I believe I am occupying an entirely original field in pointing out the true nature of leaves in *Coniferæ*, and that the increased knowledge will have an important bearing on many obscure points in their study.

Dr. Dickson uses but the language of general botany when he describes the true leaves of *Pinus* as "bud-scales," meaning thereby the scaly free portion just under the "secondary leaves" of Engelmann, and sometimes forming sheaths around them. But these free scales are scarcely leaves. The chief portion of the true leaves in most plants of the order are adnate with the stem; sometimes they have the power to develope into scaly points, at others into foliaceous tips, and at other times are without any power but to preserve their true leaf-like character. *Larix* affords the best illustration. The true leaves are linear-spathulate, entirely adnate to the stem. There are two kinds of stem-growth in *Larix*: in the one case the axis elongates and forms shoots; in the other, axial development is arrested and spurs are formed. On the elongated shoots the leaves are scattered; on the spurs they are arranged in whorls. The power of elongation possessed by the shoot is imparted to the leaves which are adherent to it, and they produce green foliaceous awl-like tips; the power of elongation which the spurs have lost is also measurably